EXPERT REPORT

BY

BILLY R. CLAY MS, DVM, DABVT

FOR
The Defendants in the:

STATE OF OKLAHOMA, ex rel, W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA, and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,

Plaintiff

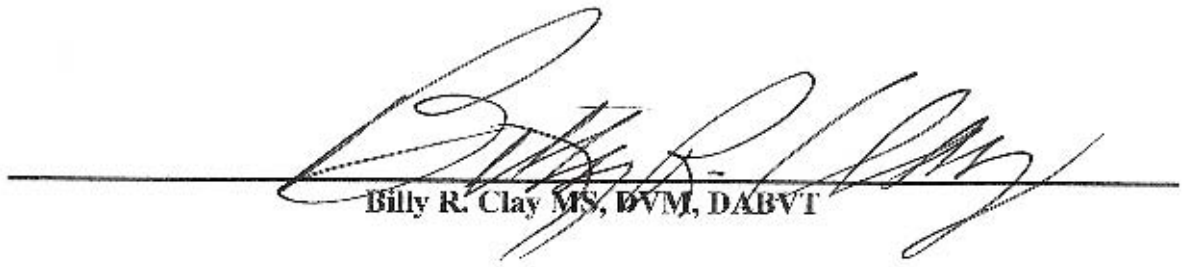
VS.

TYSON FOODS, INC., TYSON POULTRY, INC., TYSON CHICKEN, INC., COBB-VANTRESS, INC., CAL-MAINE FOODS, INC. CAL-MAINE FARMS, INC., CARGILL, INC., CARGILL TURKEY PRODUCTION, LLC, GEORGE'S, INC., GEORGE'S FARMS, INC., PETERSON FARMS, INC., SIMMONS FOODS, INC. AND WILLOWBROOK FOODS, INC.,

Defendants

CASE NO. 05-CV-0329 GKF-SAJ.
IN THE U.S. DISTRICT COURT, NORTHERN DISTRICT OF OKLAHOMA

November 29, 2008



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litter is stored, exported or applied at or near the time of removal from the poultry house. That applied is not necessarily on the same fields, annually. Not all the litter produced on a particular farm will be applied to that farmer's land. Some will be sold to other farmers or business entities in the area or shipped outside the area. Some poultry producers do not have sufficient acres of farmland to generate a need for their total production of litter. Therefore some or all of their litter is stored, or sold to others who must also apply it according to the regulations of the respective states. There are laws in place in both Oklahoma and Arkansas to regulate the surface application of poultry litter. The guidelines set forth will dictate the amount of litter that a given parcel of land can receive, as well as, identify parcels of land that should not have poultry litter applied.

HISTORY AND VALUE

Animal bedding with excrement fertilizer is not unique to the poultry industry. As long ago as 300 BC Theophrastus recognized and recommended the use of animal bedding as further enrichment for the soil. In that period the focus was on donkeys, sheep, goats and cattle. Similar recordings were made in China over 2,000 years ago. The Greeks perfected the use of such fertilizers in their soils and the Romans adopted their practices. In fact some of the Roman intellectuals took the collection of fertilizer to another level by digging pits near farm buildings for systematic collection of various wastes including animal, fowl and human along with leaves, vegetables and virtually all other organic materials they could find. In the 16^{th} and 17^{th} centuries manure with bedding fertilizer was traded as commercial fertilizer is today.

Mineral fertilizer amendments were discovered and began to be used during that same period. The extensive experimentation and utilization of mineral fertilizers that followed paved the way for an expanding population and the concentration of populations within cities. However their use did not replace organic fertilizers such as poultry litter. Additional experimentation served to demonstrate the augmentation value of organic and inorganic mineral additions for prolific plant growth (Tisdale 1956, Millar 1958, The Gale Group, Inc. 2003).

Today we continue to use animal manure fertilizers wherever they are available. The composition of manures vary with animal species, feed source, and type of bedding used. Broiler litter typically contains 55 to 75 pounds of nitrogen per ton, 60 to 80 pounds of phosphate, 40 to 50 pounds of potash and 40 to 60 pounds of calcium. It will also contain 20 to 40 percent moisture and measurable quantities of magnesium, sulfur, sodium, chloride, iron, manganese, boron, zinc, copper and other micronutrients, as well as, any additives provided in the feed or added to the litter. Its value based on nutrient content alone (N, P_2O_5 and K_2O) when compared to current inorganic fertilizer prices is in the range of $110 to $140 per ton (National Agricultural Statistics Service 2008). The added intrinsic value of litter is that the decaying organic matter adds water holding capacity to the soil and the nutrients are more slowly released as the material decays during the

growing seasons (Zhang 2002, Mullins 2002, Mitchell 1995, Zublena 1997, Vest 2004). The added water holding capacity allows crop plants to survive during periods of low rainfall and flourish during periods of adequate rainfall. The responsive growth of vegetation serves well to minimize erosion of surface soils.

Commercial inorganic fertilizers tend to be acidifying to soils. This is an undesirable trait in soils typical of the IRW. Those soils are acid prone and require the addition of lime periodically for maximum production. Poultry litter does not contribute in the same way to the acidity and it provides the additional intrinsic calcium and magnesium to further aid in acid neutralization (Zhang 1998). Likewise, poultry litter offers less soluble phosphorus for transport during excessive rainfall events (Edwards et al. 1994, Franklin et al. 2005 and Gaudreau et al. 2002).

In a ten-year study conducted by the US Department of Agriculture-Agricultural Research Service (Sainju 2007) the organic matrix of poultry litter increased soil carbon storage and microbial biomass and activity compared to inorganic fertilization. The advantage existed regardless of the cropping system (tilled with litter vs. no-till with litter applied to the surface). The conclusion was that carbon becomes sequestered in the soil surface which helps to offset atmospheric carbon dioxide and improve soil and environmental quality. For all the reasons cited above poultry litter serves as a valuable soil amendment as well as fertilizer source.

The increased demand for organic and/or natural food products has added another dimension of value to poultry and other farm animal manures. Products that carry the organic label must be grown in or on soils using fertilizers from an organic source. This market offers another opportunity for the small farming enterprise to remain profitable. Several organic food production farms exist in the region of the IRW where beef, vegetable, fruit and other farms are in operation (Kerr Center 2006 and Organic Resource Guide 2006).

AGRICULTURAL PRACTICES IN THE IRW
(Opinions 3 through 8)

The IRW consists of approximately 1.1 million acres of land most of which is used for agricultural purposes. Using the 2002 National Agricultural Statistics Service (NASS) census data provided at the county and zip code levels, the farm acres were calculated to be 698,525- about 65 percent of the total. Four thousand four hundred eight-two farms reported for that year (Appendix A, Table A-B and Appendix B). Approximately, 6,525 additional property owners of 5 acres, or greater, were not included in that summary and did not report the use of their acreage to NASS (Appendix I). The bulk of the land on the reported farms is devoted to cattle production (565,000 acres). Approximately 199,000 cattle were present in the watershed at the time of the 2002 census. Of that total 10,829 were